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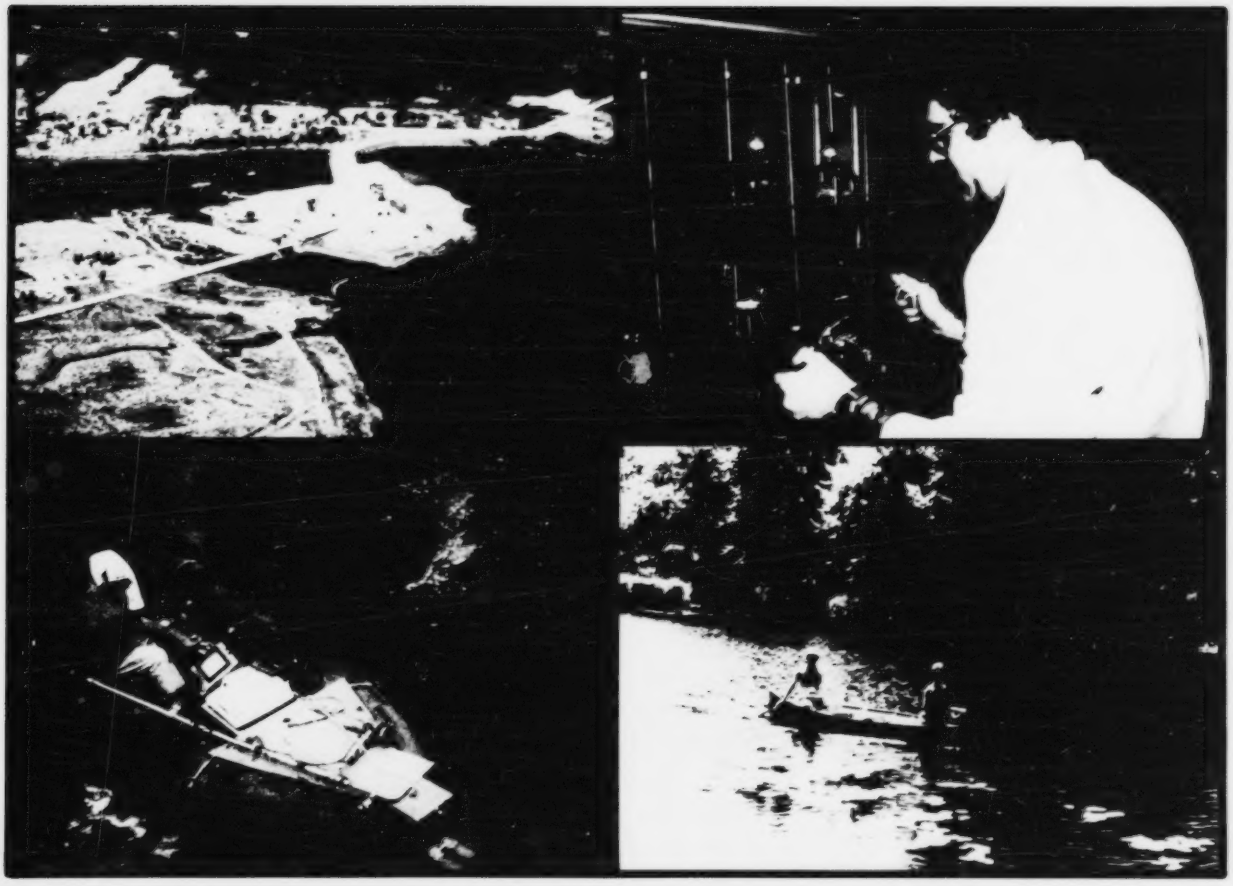

Canada

INLAND WATERS DIRECTORATE
ATLANTIC REGION
WATER RESOURCES BRANCH
DARTMOUTH, NOVA SCOTIA

EDP HARDWARE AND SOFTWARE DEVELOPMENTS

1986-87

WATER RESOURCES BRANCH

ATLANTIC REGION

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by

J.W. Clarke

Head, Data Control Section

Data Control Section
Hydrology Division
Water Resources Branch
Dartmouth, Nova Scotia
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ABSTRACT

The Atlantic Region EDP Report is published annually to document improvements to EDP Hardware and Software and to recommend a course of action for the next fiscal year.

This report contains specifics on changes to software and hardware as they pertain to the Atlantic Region during the 1986-87 fiscal year. The impact of these changes on the computation of hydrometric survey data and in supporting data intrepretation projects is described in relation to costs and benefits.

Costs of EDP equipment procurement, of EDP equipment maintenance and of providing an adequate level of communications both, within the region and nationally, are provided in detail.

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1. INTRODUCTION

During the past year, equipment, software and communications improvements have had a positive impact on both EDP procedures and capabilities. Also during this year, IW/L Management has encouraged more sharing of projects, expertise and facilities than previously. These factors have led to increased use of the WRB system by the other branches of IW/L.

A spinoff from the above is a more important role for the IW/L EDP Committee. This committee has become an important tool for managing the EDP resources efficiently. It is also effective in voicing the needs and concerns of the three branches regionally by reporting to the Regional Director and by giving representation on the C&P Atlantic EDP Coordinating Committee and nationally by giving representation at the Informatics Technology Committee Meeting.

Although the WRB EDP resources in this region are capable of meeting our present and near future needs, we do have concerns for the future. Where do we go from here? What is the most practical route to take? What will it cost? What will be the benefits? These are difficult questions to answer but this report attempts to do so or at least provide suggestions for management consideration.

2. MAINFRAME COMPUTER

In the previous report our progress toward independence from the Bedford Institute of Oceanography mainframe computer was outlined. At that time there was still minimal use by the studies engineers for statistical analysis. The Data Control Section was also using it for tape reading and to process HOURLY data in punched format on magnetic tape. An upgrade to our operating system and improvements to communications have now ended that dependence.

The RJE link and the dedicated telephone line to the BIO Cyber mainframe were both severed by the end of December 1986. Their limited use and high overhead cost justified this action. This was made possible by improved communications with the WQB VAX 750 in Moncton New Brunswick. This enabled both the Hydrology Division and the Water Planning and Management Branch to meet program goals without the mainframe. However, this increased our dependence on the mini and the DECnet link to the WQB VAX.

The loss of mainframe use made it temporarily impossible to fill requests for HOURLY data in punched format. This was due to the inability of inhouse software to handle this task. In early March 1987, the operating system and the WSC software were again updated. These changes provided reliable two-way communications with the WQB VAX 750 and HOURLY punched output capability. The improved communications also enabled WRB to better utilize the 1600 bpi tape facilities at Moncton. The transition from remote batch mainframe processing to inhouse interactive and batch processing is now complete.

2.a Operating Costs

Table I shows the mainframe computing costs incurred during 1986-87 along with the fixed and variable costs of maintaining the RJE link. Costs associated with the dedicated 1200 baud line to the mainframe were the responsibility of WP/L and are therefore not included in this report. During the period July to November 1986 there was a rush to complete tasks already begun on the mainframe. This accounts for the high usage charges during that period. In January, February and March there were no costs associated with the mainframe computer circuits or telephones since the links had been severed.

Table II is a summary of the actual computing costs (not including equipment rental) for the period April 01, 1979 to March 31, 1987. Prior to the installation of the PDP 11/44 mini computer, these charges were rapidly increasing. By March 1987 however, not only these charges but also the related equipment rental fees have been eliminated.

TABLE I

MAINFRAME COSTS FISCAL YEAR 1986/87

MONTH	YEAR	COMPUTING COST	RENTAL OF CIRCUITS	RENTAL OF PHONES
April	1986	38.49	168.25	51.40
May	1986	48.22	168.25	51.40
June	1986	95.98	168.25	51.40
July	1986	111.47	168.25	51.40
August	1986	107.68	168.25	51.40
September	1986	129.16	168.25	51.40
October	1986	228.41	168.25	51.40
November	1986	140.48	168.25	51.40
December	1986	6.01	168.25	51.40
January	1987	1.13	.....	.....
February	1987	0.00	.....	.....
March	1987	0.00	.....	.....
TOTALS		$907.03	$1514.25	$462.60

TABLE II

COMPARISON OF ANNUAL EXTERNAL COMPUTING COSTS

Note: This table does not include fixed costs relating to modem and telephone rentals.

Fiscal Year	External Computing Cost
1979-80	$ 7,822
1980-81	$ 4,775
1981-82	$18,170
1982-83	$21,659
1983-84	$24,987
1984-85	$ 5,650
1985-86	$ 2,340
1986-87	$ 907

3. MINI COMPUTER

The WRB PDP 11/44 mini computer was heavily utilized during the 1986-87 fiscal year. The WSC Division was the heaviest user of system resources. There was however, a significant increase in use by the Hydrology Division for data interpretation, report preparation and for DECnet communications with the WQB VAX 750 in Moncton. This new DECnet node provided magnetic tape service and RS/1 software access for WRB and WP/L.

Mini computer performance in relation to reliability, capability, operating cost and through-put has far exceeded our expectations. The description of hardware and software additions that follows, clearly shows the extent to which the system is being utilized. Figure I and Table III are evidence of this utilization and expansion. By looking at these it is obvious that there is little room for cost effective hardware improvements other than networking an additional CPU to the system.

3.a. Additions

3.a.1. Hardware

In May 1986 WRB received two new VISION II terminals (one with graphics) which enabled a juggle of existing terminals and the write-off of the Cybernex terminal used on the digitizer. In May the DUP-11 circuit board in the CPU that permits RJE communications to the mainframe was replaced. Although the RJE would be dropped soon this repair had to be made to enable WRB to complete processing already underway on the CYBER.

The printer/terminal (Datacom 1200) that was used to communicate with the Cyber at BIO was added to a second print queue on the mini. Major repairs have been carried out to bring this old printer up to standard.

Several expenditures to improve the word processing capability for the entire branch (sub-offices as well as at Dartmouth) were made during the past year. Among these were one additional Vision II terminal with a terminal support arm and several sets of word processing keyboard decals. This brought the total terminal purchase for the year to three units. This purchase has also provided a terminal for Don Ambler, Regional Hydrologist, and one for Sharon Lake, Engineering Clerk.

A terminal, modem and printer which was purchased in the previous year, was provided to the Charlottetown office of the WSC. All four of the WRB sub-offices have access to the mini.

3.a.2. Software

The DATAPAC link (Node #7) was activated for testing DECnet during January 1986. During the three day test period we were impressed with its general performance but found a serious problem that made it impossible to use operationally. When DECnet was active normal DATAPAC communications were not available. As DATAPAC service to our sub-offices is essential to our operations, the network was deactivated awaiting a fix from DEC.

By mid March 1986 DECnet was operational with software that for the interim would activate and deactivate the X.25 and X.29 communications as required. This enabled WRB to use normal DATAPAC (X.29 PAD service) to communicate with the field offices and DECnet (X.25 PSI service) to communicate with Ottawa. The DECnet link (Node #7) is used on a daily basis to obtain the DCP files and once per week to obtain the DCP diagnostics report. The reliability of the link has been very satisfactory. We are able to obtain DCP files from the Ottawa mini as soon as our office opens (assuming the files are available in Ottawa). This is approximately four hours earlier than previously.

The RSX11MPBL24 V 3.0 B operating system was put into use on March 02, 1987 after DEC provided a patch to the network communications. This system software upgrade improved the network communications to the WQB VAX at Moncton and network communications in general. The WRB DATAPAC link (Node #7) now provided two-way communications to all nodes on the network.

This was a significant improvement in communicating with the VAX in Moncton. The command SET HOST WQ8MON can be used from any terminal on the WRB mini to contact the VAX. This operating system also enables network communications by simple DCL and MCR commands.

Although we are pleased with the performance of the network to Moncton, we are somewhat disappointed in the links to other nodes. This disappointment stems from slow data transfer speeds and not reliability. To examine the charges incurred to maintain the regional and national DECnet communications network two tables are provided. Table VI shows the Regional Network DATAPAC Charges and Table VII the National Network DATAPAC Charges. The $3892.35 associated with the Regional Network is considered an economical alternative to micro computers in each office. Even if micro computers were purchased for each field office the Regional Network charges would not be eliminated, only reduced.

Programs for use by the public during Environment Week were developed to display DCP data, typical streamflow data and to quiz them on Environmental issues and trivia. Public reaction to this display was encouraging and personally gratifying for staff who took part. I think it is safe to say that the WRB exibit received the highest level of public participation. For this reason we are planning to use a similar computerized display for Environment Week, 1987. If time permits additional enhancements will be incorporate in the display.

In April of 1986 WRB borrowed the one-user DECtype word processing license from DCS Ottawa for testing. It was our aim to determine if DECtype could provide an adequate word processing capability for all users of the WRB mini including field offices. No formal training was provided for any staff. DECtype was used mainly for monthly report preparation during the evaluation period. All those exposed to the word processing system (WPS) were suitably impressed with its capability and recommended it be purchased. By December 1986 WRB had its own DECtype license and had put it into operational use. The only significant problem encountered is slow cursor movement (scrolling - up, down, and right or left). This seems to be software oriented and not related to the number of tasks running on the system. It is also important to note that DECtype is not a DOTS compatible WPS. For this reason its intended use should be clearly defined before procuring such a software license.

Changes were made to the Queue Manager to enable two Print Queues (one for general use and the other reserved for WSC EDP), two Batch Queues, a File Transfer Queue, and a Word Processing Queue. Batch processing can now be used more effectively for large jobs that would otherwise degrade day-time system performance. It was then possible to dedicate one print queue to WSC processing and one for general use.

3.b Operating Costs

Table III shows the major hardware items purchased as part of or for connection to the mini computer. Similarly, Table IV shows the major maintenance costs during the year.

TABLE III

MAJOR EDP EXPENDITURES (Equipment)

Note: Expenditures are in relation to the WRB PDP 11/44 mini computer system.

ITEM	COST(O&M)	COST(CAP)
THREE NEW VISION II TERMINALS (ONE GRAPHICS)	....	4685
ONE HELKO TERMINAL SUPPORT ARM	289	....
ONE GANDALF 24S MODEM	447	....
ONE PRINTER STAND WITH PAPER SHELF	259	....
CHANGES TO BACKPLANE ON MINI	1344	....
ONE RA60 DISK PACK	....	1365
DECtype V3.1 WORD PROCESSING	....	1299
ONE DEC LQP03 PRINTER	....	1400
ONE LQP03 ACOUSTIC COVER	....	615
ONE LA120 ACOUSTIC COVER	....	615
ONE LQP03 BIDIRECTIONAL FORMS TRACTOR	....	380
ONE HELKO TERMINAL SUPPORT ARM	....	289
ONE RA60 DISK PACK	....	1365
HS SERIAL INTERFACE BOARD FOR U82A PRINTER	250	....
ONE GANDALF 24S MODEM	447	....
TOTALS (O&M)	$3,036	(CAP) $12,013

TABLE IV

MAJOR EDP EXPENDITURES (Maintenance)

Note: Expenditures in relation to the WRB PDP 11/44 mini computer system.

ITEM	COST
REPAIR TO LA120 PRINTER	348.00
DIAGNOSING PROBLEM WITH RJE	230.00
REPLACEMENT OF DUP11 BOARD (RJE)	1518.20
REPLACEMENT OF MEMORY BOARD (WOULD NOT BOOT)	613.00
REPAIR DEC	475.95
REPAIR VISION II TERMINAL	134.00
REPAIR TO DATACOM 1200 PRINTER	81.00
REPAIR TO DATACOM 1200 PRINTER	661.50
REPAIR TO DATACOM 1200 PRINTER	348.00
REPAIR TO DATACOM 1200 PRINTER	330.60
REPAIR DEC	332.75
REPAIR DEC	218.50
REPAIR TO RL02 DISK DRIVE (DL0:)	501.00
REPAIR TO RL02 DISK DRIVE (DL2:)	386.00
REPAIR TO MINI (CABLE TO DISK DRIVE)	442.00
TOTAL	$6620.50

TABLE V

MAJOR EDP EXPENDITURES (Maintenance)

Note: Expenditures in relation to the PRO 350 micro computer system.

ITEM	COST
Replacement of RDF11-CC Memory Board	752.79
Replacement of Winchester Disk Drive	475.95
Replacement of RX50 Disk Unit	517.00
Replacement of RDF11-CC Memory board	969.00
TOTAL	$2714.74

3.c Future Considerations

Preliminary discussions have been held with DCS Ottawa and DEC Dartmouth concerning the purchase of a Micro VAX II system. Management does not presently consider the direct need significantly urgent to proceed with such a purchase. However, there is an important indirect need that must be considered. It is vital that WRB Atlantic be in step with other regional WRB offices across Canada and that we be able to use any new software that is being developed for VAX systems. New applications software being developed by the HQ Hydrology Division and other new software such as DBMS will be created/purchased for 32 bit processors. To be able to use these tools WRB Atlantic must remain current by allocation of capital funds to EDP equipment.

These concerns and the fact that the mini is now often slowed by a heavy processing load and the number of system users are now considered by the author, as adequate justification for such a purchase. If additional EDP is added as a result of WP/L projects and DOTS utilization, the Micro VAX will be essential if the WRB is to maintain its present level of service and EDP capability to its own staff.

TABLE VI

Regional Network DATAPAC Charges

Mo/Yr	Fredericton	Moncton	Charlottetown	Dartmouth	Cornerbrook	St. John's
Apr/86	166.38	0.00	0.00	0.07	0.00	26.05
May	58.35	0.00	19.52	0.01	0.00	5.58
Jun	0.00	0.00	0.00	222.57	0.00	0.00
Jul	82.25	0.00	4.10	0.00	0.00	27.03
Aug	52.29	0.00	16.85	0.00	7.29	0.19
Sep	133.27	0.00	2.08	0.00	107.89	50.46
Oct	82.01	0.00	3.68	0.00	53.06	49.22
Nov	334.72	3.51	6.79	0.00	90.55	48.34
Dec	305.06	12.67	7.80	0.21	79.63	75.03
Jan/87	195.90	0.00	13.35	0.00	52.89	336.50
Feb	106.38	0.00	0.00	0.00	59.06	202.45
Mar	127.28	0.00	114.14	0.00	186.00	363.89
TOTALS	$1643.89	$16.18	$188.31	$222.86	$636.37	$1184.74

Grand Total (Regional Network DATAPAC Charges) = $3892.35

TABLE VII

National Network DATAPAC Charges

Mo/Yr	Ottawa	Guelph	Toronto	Winnipeg	Regina	Calgary	Vancouver	Other
Apr/86	10.72	0.00	0.00	0.14	0.11	0.08	0.00	0.00
May	2.15	0.00	0.00	114.08	34.99	18.45	0.00	0.00
Jun	93.98	0.00	0.00	0.00	0.00	0.00	0.00	3.94
Jul	0.24	0.00	0.00	89.78	42.53	1.19	0.00	0.00
Aug	0.09	0.00	12.83	88.06	33.69	6.95	0.00	0.00
Sep	2.27	1.22	15.51	52.63	8.25	3.72	0.00	0.00
Oct	0.01	0.00	7.07	45.35	1.18	5.74	0.00	0.00
Nov	0.10	0.00	0.26	164.00	1.21	0.69	0.00	0.00
Dec	0.00	0.00	0.00	137.46	0.87	6.94	0.00	0.00
Jan/87	0.00	0.10	0.00	129.60	1.81	6.26	0.00	0.00
Feb	0.95	0.00	0.00	137.31	8.25	122.19	0.00	0.00
Mar	0.00	0.00	0.00	93.96	9.11	141.28	0.00	0.07
TOTALS	$110.51	$1.32	$35.67	$1052.37	$142.00	$313.49	$0.00	$4.01

Grand Total (National DATAPAC Charges) = $1655.36+($4.01 unknown users)

FIGURE I

CONFIGURATION OF ATLANTIC REGION

WRB EDP HARDWARE

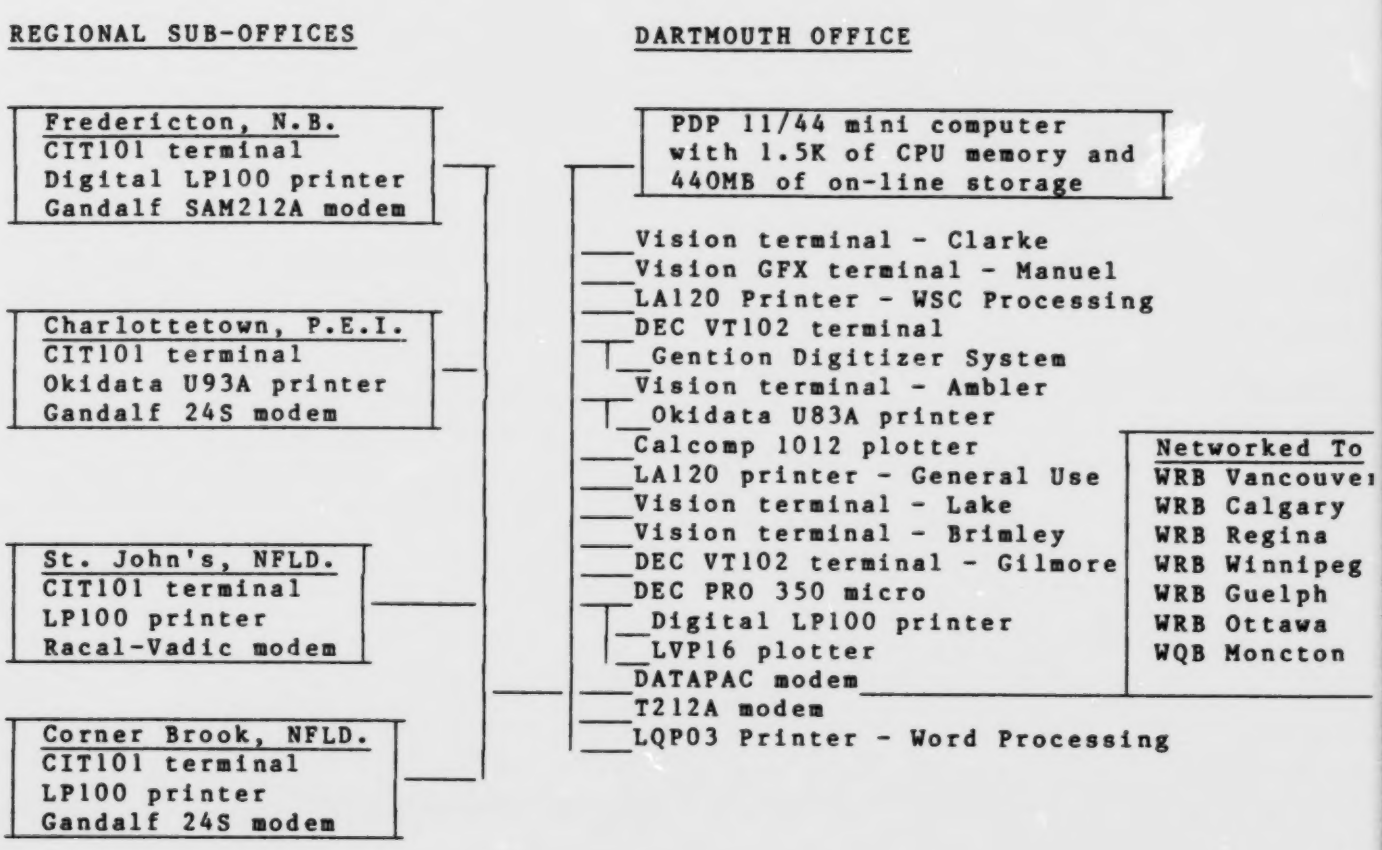

TABLE VIII

USE OF COMMUNICATIONS PORTS ON PDP 11/44 AT DARTMOUTH

PORT	USE OR DEVICE	LOCATION OR WORK STATION
TT0	LA120 PRINTER/CONSOLE	FOR STREAM JOBS COMPUTER ROOM
TT1	T212A MODEM	LINE 6-8844 COMPUTER ROOM
TT2	PRINTER FOR CONSOLE MESSAGES	J. CLARKE
TT3	CALCOMP 1012 PLOTTER	COMPUTER ROOM
TT4	DIGITIZER (VT102 TERMINAL)	COMPUTER ROOM
TT5	TERMINAL VISION II	S. LAKE
TT6	LA120 PRINTER/CONSOLE	FOR GENERAL USE DATA CONTROL SECTION
TT7	TERMINAL VISION II	J. MANUEL
TT10	PRO 350 MICRO	POL & BRIMLEY
TT11	TERMINAL DEC VT102	WSC TECHNICIANS
TT12	TERMINAL VISION 2200+	J. CLARKE
TT13	TERMINAL VISION 2200+	POL & BRIMLEY
TT14	TERMINAL CIT101	WATER PLANNING BRANCH
TT15	TERMINAL VISION II	D. AMBLER
TT16	NOT USED	
TT17	NOT USED	
TT20	LQP03 LETTER QUALITY PRINTER	S. LAKE

TABLE IX

COMPARISON OF EDP PER CALL REPAIR COSTS

WITH COMPANY SERVICE CONTRACT CHARGES

Month	Year	Mini $	Micro $	1012 $ Plotter	LVP16 $ Plotter	Digitizer $
April	1986	0/1158	753/67	0/96	0/13	0/110
May	1986	2096/1208	0/67	0/96	0/13	0/110
June	1986	0/1208	0/67	0/96	0/13	0/110
July	1986	613/1208	0/67	0/96	0/13	0/110
August	1986	348/1208	0/67	0/96	0/13	0/110
September	1986	501/1208	0/67	0/96	0/13	0/110
October	1986	331/1208	476/67	0/96	0/13	0/110
November	1986	862/1208	517/67	0/96	0/13	0/110
December	1986	442/1263	0/67	0/96	0/13	0/110
January	1987	81/1302	0/67	0/96	0/13	0/110
February	1987	796/1302	0/67	0/96	0/13	0/110
March	1987	551/1302	969/67	0/96	0/13	0/110
T O T A L S		6621/14,783	2715/804	0/1,152	0/156	0/1,320

4. Micro Computer

4.a Additions

4.a.1 Hardware

No new or replacement hardware was purchased for the PRO 350 micro computer during the 1986-87 fiscal year.

4.a.2 Software

No new software packages were purchased or developed for the PRO 350 micro computer during the 1986-87 fiscal year.

4.b Operating Costs

In Table IX repairs to the PRO 350 micro computer are shown as $2715 which is more than six times the $449.00 amount that was spent in the previous year. Prior to this year a total of only $599.00 had been required to maintain the micro system. The attached LA100 printer and the LVP16 plotter have had no associated repairs since being purchased. Table X summarizes repair costs to date for the PRO 350 system and compares these costs to those of contract services. Obviously this system should be replaced or at least covered by a service policy. Readers should note that in the previous report Table VII should have shown service contract charges for the PDP 11/44 as $5,950 not $6,487. This correction reduces the accumulated savings to $35,021 as shown on the following Table X.

TABLE X

SUMMARY OF ACTUAL COSTS VERSUS CONTRACT COSTS

FOR THE PAST FOUR FISCAL YEARS

System	Service Contract Cost	Actual Cost	Savings
PDP 11/44 mini	44,850	9,829	35,021
PRO 350 micro	3,149	3,314	-165
Calcomp 1012 Plotter	3,840	481	3,359
LVP 16 Plotter	312	.....	312
Gentian Digitizer	5280	.....	5280
Totals	$57,431	$13,365	$43,807

4.c Future Considerations

The PRO 350 with its present attached plotter and printer and the custom software is serving a very important role to the Hydrology Division. The need to replace the unit comes from two areas; one, WRB H.Q. Hydrology Division future software will be developed for a 32 bit CPU not the current 16 bit PRO 350 format and two, due to daily use for 4 years the unit is simply wearing out.

A stand alone micro linked to the mini appears to still be required. The attached LVP16 plotter can provide a much better product than the mini Calcomp plotter. In addition, software on the micro is not available for the mini therefore, a replacement unit is needed.

5. Recommendations for 1987-88

5.a The PRO 350 micro computer be written off or used as a trade in for a first level Micro VAX computer. The frequency of repairs on this unit and the conversion of Hydrology Division software to 32 bit format supports this recommendation. The 88/89 regional EDP plan should include capital for the purchase of the new CPU. The LVP16 plotter and the LA100 printer currently connected to the PRO 350 should be connectable to the new replacement CPU.

5.b The PDP 11/44 mini computer should continue to be the central CPU for all regional EDP and WPS processing. The 86/87 cost of $3,900 for all regional communications would not significantly reduce by purchasing local CPU (micro computers) stand-alone units for the WSC offices.

5.c Additional CPU power be added to the PDP 11/44 mini computer to accommodate additional WRB and IW/L users, to enable WRB to use 32 bit software now being developed in Ottawa, and possibly to support the introduction of DOTS within IW/L. Preplanning could result in the purchase of a more powerful Micro VAX than the one in 5.a. Such a multipurpose unit would serve EDP, WPS, Scientific computations as well as use existing network communications.

5.d WRB H.Q. should investigate what use is being made in each region of the RL02 disk drives. If as in this region little use is being made of them, discussions should be held with DEC in degard to trading the three smaller drives with their cabinets on the purchase of a third RA60 drive to fit into the existing RA60 cabinet.